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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/731,373	12/09/2003	Chellappa Balan	132814-1	4420

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GENERAL ELECTRIC COMPANY
GLOBAL RESEARCH
ONE RESEARCH CIRCLE
PATENT DOCKET RM. BLDG. K1-4A59
NISKAYUNA, NY 12309

EXAMINER	
WALKER, KEITH D	

ART UNIT	PAPER NUMBER
1795	

NOTIFICATION DATE	DELIVERY MODE
11/09/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/731,373	BALAN, CHELLAPPA	
	Examiner	Art Unit	
	KEITH WALKER	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 August 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4-10,13-17,19-35 and 42* is/are pending in the application.

4a) Of the above claim(s) *20-35* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4-10,13-17,19 and 42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Claims 1, 2, 4-10, 13-17, 19-35 & 42 are pending in the application with claims 20-35 withdrawn. Claims 1, 2, 4-10, 13-17, 19 & 42 are pending examination as discussed below.

Claim Rejections - 35 USC § 102/103

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1, 2, 4-9, 13, 15, 16, 19 & 42 are rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over US 5,380,600 (Hansen).

Hansen teaches a co-production system comprising a molten carbonate fuel cell and a separation unit configured to receive anode exhaust steam. The recycled anode exhaust stream goes though a shift reactor, a condenser and a hydrogen recovery unit

before being fed back to the anode inlet stream. Natural gas is used for the fuel and air for the oxidant (Fig. 1; Abstract; 2:55-3:40). A heat exchange plate is used to receive and heat the fuel feed stream (Figs. 2 & 3). The system is configured to flexibly control the production of hydrogen an electricity that is on demand by altering the outlet reforming from adiabatic to no outlet reforming to isothermal (Tables 1-3).

Regarding claims 2, 4 & 5, these limitations are directed to the method of operating the fuel cell and intended use of the fuel cell and while considered, do not necessarily further limit the structure of the fuel cell. While intended use recitations and other types of functional language are not entirely disregarded, the intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. Claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function (MPEP 2114). The manner of operating the device does not differentiate an apparatus claim from the prior art. A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim (MPEP 2114).

Claim Rejections - 35 USC § 103

2. Claims 1, 2, 4-10, 15, 17, 19 & 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,084,362 (Farooque) in view of US 7,052,790 (Nakamura) and as evidenced by US Patent 3,522,101 (Baker).

With respect to claims 1, 9 & 10, Farooque teaches a fuel cell system for co-production of hydrogen and electricity comprising a molten carbonate fuel cell or solid oxide fuel cell assembly and an internal reforming apparatus that produces hydrogen fuel from hydrocarbon gas. The fuel cell system further comprises hydrogen separation and recovery device (8), which separates and recovers the unspent hydrogen in the anode exhaust, which comprises CO, CO_2, steam and unspent fuel (1:43-56, 2:1-10, 2:54-61). Unspent hydrogen in the anode exhaust is recycled back to the anode inlet (Fig. 1).

Regarding claims 2, 4 & 5, these limitations are directed to the method of operating the fuel cell and intended use of the fuel cell and so while considered, do not necessarily further limit the structure of the fuel cell. While intended use recitations and other types of functional language are not entirely disregarded, the intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. Claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function (MPEP 2114). The manner of operating the device does not differentiate an apparatus claim from the prior art. A claim containing a "recitation with

respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim (MPEP 2114).

With respect to claim 2, it would be obvious to one skilled in the art at the time of the invention to operate the fuel cell in a low utilization manner so as to increase the amount of hydrogen in the exhaust so the hydrogen can supply fuel to other components of the system like a burner or gasifier, as taught by Farooque.

With respect to claim 4, it is well known in the art that molten carbonate fuel cell are operated at voltages ranging from 0.55 to 0.8 volts as evidenced by Baker (US 3,522,101), Example 2.

Regarding claim 5, Farooque is silent to the mole fraction of hydrogen at the anode outlet. However, Farooque discloses the hydrogen content in the exhaust stream can be manipulated by converting any CO in the stream to hydrogen (2:53-61).

Therefore, it would have been obvious to one of ordinary skill in the art to control the mole fraction of hydrogen in the anode exhaust between 0.1 and 0.5, because Farooque discloses converting the carbon monoxide in the exhaust stream can modify the amounts of hydrogen in the anode exhaust.

With respect to claim 6, Farooque teaches the oxidant is air.

With respect to claim 7, Farooque teaches the use of methane as the fuel (2:22-29).

With respect to claim 8, Farooque teaches the heat provided by the hydrogen for the gasifier (5) (2:42-53).

With respect to claim 15, Farooque teaches the fuel cell system comprising a shift converter and a hydrogen separation and recovery device (2:54-61).

Farooque is silent to the system comprising a water condenser for the anode exhaust and configuring the system to control production of hydrogen and electricity.

Nakamura teaches a fuel cell system comprising a cooling water, a cooling water pump, a heat exchanger, a fuel-side condenser and an oxidizer-side condenser that cool exhaust fuel gas and the exhaust oxidizer gas discharged from the fuel cell to condense content water vapor (Abstract; Fig. 1; 3:45-60, 6:15-20, 9:50-55). A controller is used to control the workings of the entire system (Figs. 2-13; 14:35-45).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use add a condenser downstream of the fuel cell system of Farooque, because Nakamura teaches the use of the condenser to condense content water vapor in the exhaust which creates a more efficient system by recovering waste products. Also, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the controller of Nakamura with the system of Farooque to control the entire system as required based on power needs. Farooque teaches the available hydrogen is dependent upon the fuel utilization. Nakamura teaches configuring a system with a controller to control the fuel cell system to improve the efficiency of the system.

Regarding claim 17, Farooque incorporates by reference the teachings of US 4,620,914 (Abens) (2:62-65). Abens teaches the hydrogen separation device includes a membrane (Abens - 1:20-25).

3. Claims 13, 14 & 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,084,362 (Farooque) and US 7,052,790 (Nakamura) as applied to claims 1 & 15 above, and further in view of US 2004/0202914 (Sridhar).

The teachings of Farooque and Nakamura as discussed above are incorporated herein.

Farooque and Nakamura are silent to the system comprising a carbon dioxide separator.

Sridhar discloses a fuel cell system comprising a carbon dioxide separator (405) to separate the carbon dioxide before the anode exhaust is discharged to the ambient. An adsorption /absorption based separator is used (Fig. 9, paragraph 93.

Therefore, it would have been obvious to one of ordinary skill in the art to use add a carbon dioxide separator downstream of the fuel cell system of Farooque, because Sridhar teaches the use of the separator to separate the carbon dioxide before the anode exhaust is discharged to the ambient.

Response to Arguments

Applicant's arguments filed 8/3/09 have been fully considered but they are not persuasive.

Applicant argues Hansen does not teach all the elements of claim 1, namely "said system configured to flexibly control production of hydrogen and electricity on demand." As stated in the rejection above, Hansen teaches a system configured to

flexibly control the production of hydrogen an electricity that is on demand by altering the outlet reforming from adiabatic to no outlet reforming to isothermal (Tables 1-3). Furthermore, the system can be turned on and off and therefore the system is configured to control the amount of hydrogen and electricity on demand. Applicant argues Hansen does not produce both hydrogen and electricity. Since the teachings of Hansen are drawn to a fuel cell, electricity is produced. As for the hydrogen, shift unit (14) produces hydrogen according to formula 2 (3:25-30; Tables 1-3).

Regarding the rejection of Farooque in view of Nakamura, applicant appears to argue that the claim 1 limitations "said system configured to flexibly control production of hydrogen and electricity on demand" and "produce a hydrogen rich stream" are not taught. First, since the teachings of Farooque and Nakamura are drawn to a fuel cell, electricity is produced. Second, as taught by Farooque, hydrogen is produced and recovered from the anode exhaust by the shift converter (7A) (Fig. 1; 2:50-62). Also taught is that the hydrogen production is based on the fuel utilization and the fuel utilization is part of the operational parameters of the fuel cell. So the hydrogen production is configured to be flexibly controlled on demand based on the fuel utilization (3:30-45). Furthermore, Nakamura teaches a controller that controls the operational parameters of the fuel cell system, which adds to the configuration of a system to flexibly control the electricity and hydrogen production. Third, the system can be turned on and off and therefore the system is configured to control the amount of hydrogen and electricity on demand. The entire and whole teachings of Farooque and Nakamura

have been taken into account and as discussed above, they render obvious the invention as claimed.

Applicant does not introduce any new arguments regarding claims 13, 14 and 16 and so no response is required. The arguments regarding the teachings of Farooque and Nakamura as discussed above, apply here.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEITH WALKER whose telephone number is (571)272-3458. The examiner can normally be reached on Mon. - Fri. 8am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Keith Walker/
Examiner, Art Unit 1795